Lower Sixth AL Maths Homework 2 **Name:**

1 Write down the equation of the line with gradient 3 through the point (4, –1) in the form $y - y_1 = m(x - x_1)$.

[1 mark]

5 The line joining *A* (4, –5) to *B* (18, k) has gradient $\frac{9}{7}$

Find the exact length of *AB*

[4 marks]

7 Three points *A*, *B* and *C* have coordinates *A* (8, 17), *B* (15, 10) and *C* (–2, –7)

Show that angle *ABC* is a right angle.

[3 marks]

8 A line has equation $y = k$, where k is a constant. For which values of k does the line not intersect the circle with equation $x^2 + 3x + y^2 + 2y - \frac{3}{4} = 0$.

[4 marks]

8.

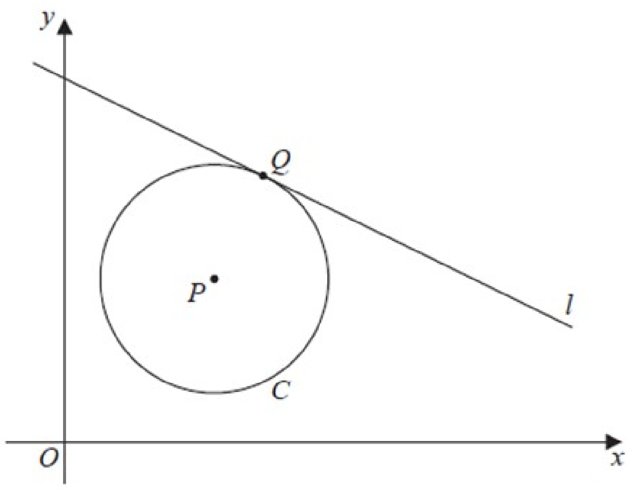

Diagram not drawn to scale

Figure 4

The circle C has centre $P(7, 8)$ and passes through the point $Q(10, 13)$, as shown in Figure 4.

(a) Find the length PQ, giving your answer as an exact value.

(2)

(b) Hence write down an equation for C.

(2)

The line l is a tangent to C at the point Q, as shown in Figure 4.

(c) Find an equation for l, giving your answer in the form $ax + by + c = 0$, where a, b and c are integers.

(4)

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1	$y-(-1)=3(x-4)$	1

Q	**Marking Instructions (approach one)**	AO	Marks	**Typical Solution**
5	Selects an appropriate method by finding an expression for the gradient and forming an equation (PI by working on a diagram)	AO3.1a	M1	Gradient = $\frac{k--5}{18-4}=\frac{k+5}{14}$ $\frac{k+5}{14}=\frac{9}{7}$ $k=13$ $\sqrt{18^2+14^2}$ $=\sqrt{520}$ $=2\sqrt{130}$
	Solves the equation to find the correct value of k PI by vertical displacement of 18	AO1.1b	A1	
	Substitutes 'their' value of k and applies Pythagoras' rule to obtain the required distance	AO1.1a	M1	
	Obtains 'their' correct exact value for the distance *AB*	AO1.1b	A1F	
	Total		**4**	

Q	**Marking Instructions (Approach two)**	**AO**	**Marks**	**Typical Solution**
5	Selects an appropriate method by forming the right angled triangle *ACB* with right angle at *C*, vertically below *B* and expresses the given gradient in terms of a tan *A*	AO3.1a	M1	$\tan A=\frac{9}{7}$ $\cos A=\frac{7}{\sqrt{130}}$ $AB=\frac{AC}{\cos A}$ $AB=\frac{14\sqrt{130}}{7}=2\sqrt{130}$
	Finds the exact value of $\cos A$ correctly	AO1.1b	A1	
	Uses $AB=\frac{AC}{\cos A}$	AO1.1a	M1	
	Obtains their correct exact value for the distance *AB*	AO1.1b	A1F	

Q	Marking Instructions	AO	Marks	Typical Solution
7(a)	Uses a technique which could lead to showing two lines are perpendicular. Obtains at least one correct distance (or distance^2) or gradient.	AO3.1a	M1	$AB^2 = (8-15)^2 + (17-10)^2$ $= 98$ $AC^2 = (8--2)^2 + (17--7)^2$ $= 676$ $CB^2 = (15--2)^2 + (10--7)^2$ $= 578$ $AB^2 + BC^2 = 98 + 578$ $= 676$ $= AC^2$ Angle ABC is a right angle.
	Obtains three correct distances (or distance^2) or two gradients. Lengths: $7\sqrt{2}, 17\sqrt{2}, 26$ Gradients: $AB = -\frac{7}{7}, BC = \frac{17}{17}$	AO1.1b	A1	
	Completes correct rigorous argument to show required result Uses Pythagoras OR Multiplies gradients to show product is -1 AND Writes a concluding statement.	AO2.1	R1	

8	$x^2 + 3x + k^2 + 2k - \frac{3}{4} = 0$	1
	If the line does not intersect the circle, then $b^2 - 4ac < 0$ $3^2 - 4 \times 1 \times \left(k^2 + 2k - \frac{3}{4}\right) < 0$	1
	$9 - 4k^2 - 8k + 3 < 0$ $-4k^2 - 8k + 12 < 0$	1
	$4k^2 + 2k - 3 > 0$ $(k-1)(k+3) > 0$ $k < -3$ or $k > 1$	1
	Alternative method: Find the centre and radius of the circle and then consider which horizontal lines would intersect.	

M1 substitutes y=k into the circle equation

E1 states that the discriminant is less than zero for no real roots

M1 finds the discriminant – any correct form

A1 correct inequalities

8(a)	$\{PQ=\}\ \sqrt{(7-10)^2+(8-13)^2}$ or $\sqrt{(10-7)^2+(13-8)^2}$	M1
	$\{PQ\} = \sqrt{34}$	A1
		(2)
8(b)	$(x-7)^2+(y-8)^2=34 \ \left(\text{or } \left(\sqrt{34}\right)^2\right)$	M1 A1 oe
		(2)
8(c)	$\{\text{Gradient of radius}\}=\dfrac{13-8}{10-7}$ or $\dfrac{5}{3}$	B1
	Gradient of tangent $=-\dfrac{1}{m}\left(=-\dfrac{3}{5}\right)$	M1
	$y-13=-\dfrac{3}{5}(x-10)$	M1
	$3x+5y-95=0$	A1
		(4)